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The evolution of the vertebrates is discussed at considerable length, including chapters on the reptiles, the birds, the archaic mammals, the modern mammals, the carnivores, the proboscideans, the horses, the camels, and man.

It is well indexed and illustrated.

Organic Evolution, by Richard Swann Lull. Illustrated by 253 figures; 729 pages. The Macmillan Co., 1917.

ORIGIN AND EVOLUTION OF LIFE

In this book Osborn undertakes to deal with evolution in terms of energy,—of action, reaction, and interaction,—rather than in terms of mechanism. Life, whether simple or complex, is chiefly concerned with capture of energy, storage of energy, and release of energy. Mechanism has taken form about these physicochemical processes. The physicochemical actions and interactions entering into life-phenomena the author sums up as follows: (1) those of the inorganic environment; (2) those of the developing organism; (3) those of the germ or heredity chromatin, and (4) the life environment.

Evolution is proceeding in each of these realms, and the scientific and philosophic problem is to discover how these four evolutions interact and are adjusted to each other. In particular it is to be determined how the evolution of the germ plasm is influenced by and adjusted to the changes in the other three.

The treatment of life origins revolves about the following proposition: "Every physicochemical action and reaction concerned in the transformation, conservation, and dissipation of energy produces also either as a direct result or as a by-product a physicochemical agent of interaction which permeates and affects the organism as a whole or affects some special part. Thru such interaction the organism is made a unit, and acts as one, because the activities of all the parts are correlated." And thus as the evolution of *action* and *interaction,* of receptors and effectors, has proceeded there has been a corresponding evolution of *interaction* which is responsible for the harmony within the organism. Heredity becomes, in this conception, an outcome of the evolution of interaction.

As instance and illustration of such regulating and balancing of actions and reactions may be cited internal secretions, products of life reactions which circulate in the system and secure coordination of activities at various points within it.

Clearly the present state of our knowledge will allow only the most elementary elaboration of such a thesis. The author undertakes specifically to suggest the manner in which the lower organisms,—bacteria, algæ, etc.,—capture electric energy, heat energy, the energy of sunlight in the building up of the form of living substance.

In the second part of the book the evolution of the animal form is traced in invertebrates and chordates as shown in the geological record, in an effort to illustrate how adaptive form may arise in connection with the essential actions, reactions, and interactions. In this enterprise the author develops advantageously his well known principle of adaptive radiation in the external body form as illustrated in vertebrate evolution.

All zoologists will be grateful to the writer for putting the familiar material from a new point of view. It is a compelling and stimulating statement. More than any recent writing on the subject, this book synthesizes the evolutions of astronomy, geology, physics, chemistry and biology.

The book is a beautiful and satisfying product of evolution, both in respect to its energy and its mechanical form.

The Origin and Evolution of Life, by Henry Fairfield Osborn. Illustrated, 350 pages. Charles Scribner's Sons, 1917. Price $3.00 net.

THE MICROSCOPE

This classic manual, produced by our long-time member and past president, Professor S. H. Gage, is now in its twelfth edition. This edition, which is largely revised, differs from previous ones chiefly in the omission of matter pertaining to micro-chemistry and metallography, and in the up-to-date treatment of those elaborations of processes and apparatus that have taken place during the last ten years. These include especially,—the single objective binocular; the dark-field illuminator; apparatus making possible the application of powerful electric lights for demonstration and drawing;